Path-dependent development in Drachten and Harlingen

A secondary research about the influence of pathway development in small cities in the Netherlands

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Abstract

Path-dependent development means that trough historic events and regional factors a path for cities is laid out. In this research, the developmental paths of two small sized cities in the north of the Netherlands are discussed. The cities are Drachten and Harlingen and they were chosen because they share a point, in 1950, when both cities where equal in size. After this common point both cities took a very different path. The aim of the research is to discover which factors played a prominent role in the creation of path-dependent development. The developmental paths the cities are on will be examined by discussing the following factors: history, demographics, economics and reachability. By connecting and comparing these factors with each other and to relevant theories the most influential factors for the different paths become visible. This analysis is done by examining historic literature, governmental data, SPSS and GIS.

The findings are that historic events had more influence than regional factors in the growth of the cities. However, more growth is not always better. The development in Drachten was mostly exogenous compared to the more endogenous development in Harlingen. This shows itself in the resilience of the cities, Harlingen being the more resilient of the two.

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1.INTRODUCTION

1.1 Background

Why some cities grow more than others is one of the core issues in the Economic Geography. Many factors play a role in this and there are many theories about these factors. An influential theory is the theory of path-dependence. This theory is part of the Evolutionary view on Economic Geography and has attracted much attention. Still, the causes and consequences of path-dependent issues do not have clear answers yet. Also, most of the research about pathway development and path-dependence, such as Terluin (2003), Martin & Sunley (2006), Boschma (2007) and Arthur (1989), has been about regions with larger economies.

This research will look at how path-dependence has an influence on the development of cities with smaller economies, where no large innovations have taken place. The path dependence theory will be connected to the theories of agglomeration forces (Fernandes et al., 2017; Jacobs, 1969; Marshall, 1980) and theories about proximity and gravity forces (Redding and Venables, 2002; Anderson, 2016).

The cases that will be discussed are Drachten and Harlingen. Both cities have always had very different developmental paths, but in 1950 both cities crossed paths, hereafter they both took a different path again. During this common point, in 1950, both cities had approximately 10000 inhabitants (Bruintjes, 2007, p7; CBS, 1950). Hereafter, in the period from 1950 till 1999 Smallingerland, the municipality in which Drachten is located, experienced the biggest population growth of all three northern provinces in the Netherlands (NIDI, 2003). In this same time period, Harlingen had only a small population growth.

1.2 Research problem

This research is about why cities develop differently from each other and is based on the theory of path-dependence. According to this theory there are factors which set out a developmental path for a city. This path can be so strong that it can lead to a lock-in. This research will look how historical, demographical, economical and infrastructural factors created two different paths for the two cases. The sum of these factors should, eventually, show a developmental path and show which factors were most influential.

The central question in this research is:

What are the causes for the different developmental paths and what are the consequences of these different developmental paths, focusing on economic, infrastructural, housing and demographic aspects, in the cities of Drachten and Harlingen in the time period from 1950 till 2017?

This question will be answered using multiple sub questions which implement the factors stated above. The sub questions are:

- How do the historical context and historical paths of both cities differ?

- How do the demographic developments differ in time?

- How do the cities differ economically?

- How did the reachability of the cities changed over time and how does this differ between the cities?

1.3 Structure

The research has the same setup as the sub questions. This should provide a logical overview of the developments of the two cities.

First, the theoretical framework section will provide an overview of the relevant theories. Second, the methodology will be discussed. Third, the results will be discussed in the following order:

- History and context: Here the history, context, and location of both cities will be discussed.

- Growth of the cities: First, demographic changes will be discussed (i.e. changes in the population, migration and natural population growth). Second, changes in the housing stock will be discussed.

- Economics: Here there the main economic branches in the cities are compared and how agglomeration advantages played a role in these branches are discussed. Additionally, the employment growth and the economic resilience in the cities will be discussed.

- Reachability: Here the focus will be on how the reachability of both cities has changed over time. This will be done by visualizing and calculating the travel times, which will be compared to theories about proximity and gravity.

Finally, the conclusion and recommendations for further research are provided.

2. THEORETICAL FRAMEWORK

2.1 Path-dependence

INFLUENCE OF HISTORICAL EVENTS

One of the core researches about path-dependence is the 'economies of QWERTY research' by David (1985), in which he talks about how historical events can lock-in a path for the future which is not the optimal situation. The old typewriters used the QWERTY keyboard and with the coming of new typing machines QWERTY remained the dominant keyboard system. Even when other keyboard systems, such as DSK, proved to perform better QWERTY remained the main keyboard system (David 1985).

David (2000) says this locked-in QWERTY typewriting system is because of history, and history can never un-happen. Once the dominant position of QWERTY (history) was set this could not un-happen, so it kept its dominant position even when it was proven to be not optimal. Path-dependency can be seen as "non-ergodic", an expression that means that the current situation is dependent on history (Henning et al., 2012). Therefore, in discussing our current situations there must be looked at historical events because history matters and it can have huge impacts on our current situation (David, 2000).

LOCK-IN

As said in the studies by David (1985; 2000) a lock-in plays an important role in path dependence. Arthur (1989) was one of the firsts Evolutionary geographers and describes a lock-in as: "inflexibility in that once an outcome (a dominant technology) begins to emerge it becomes progressively more 'locked in'; and non-ergodicity in that historical 'small events' are not averaged away and 'forgotten' by the dynamics - they may decide the outcome" (Arthur 1989, p.117). Thus, he argues that a lock-in will cause inflexibility and that even small historical events can influence the developmental path. He also talks about non-ergodic events which means that, as Arthur (1989) said, even small consecutive processes are not able to move freely but are dependent on historical events.

One of the main causes for a lock-in are sunk costs (David, 2000). Deviating from a developmental path will create costs because not all old capital will be used in the new path, the costs of this old capital are referred to as sunk costs. A way to overcome a lock-in is by the emergence of new variation and a continuous momentum of contingency (Gluckler, 2007).

CRITIQUE ON RANDOMNESS OF HISTORICAL EVENTS

One of the main critique of Arthur's study (1989) is on his assertion that historical events occur randomly and that space is irrelevant. Boschma (2007) argues that historical events do not randomly emerge but that they are highly dependent on space and that place-dependent processes play a key role in path dependency. Martin and Sunley (2006) argue that path dependence and lock-in are place dependent processes and require a geographical explanation. They state that the assumption that path creation happens randomly and spontaneous is too simplistic and that regional factors play, indeed, a relevant role in path creation (Martin & Sunley, 2006).

2.2 Clustering and Agglomeration economies

Clustering means that firms locate near each other because they take location decisions to maximize their profits (Venables 2005). Agglomeration theories play an important role in explaining why firms cluster in a certain region and why, after that, this region becomes more competitive than others (Martin, 1999). According to agglomeration theories (Fernandes et al., 2017), it is important to look at the specialization externalities, which explain that similar industries concentrate at one place because of cost reduction and innovation (Marshall, 1890). Other important factors include urbanization externalities, which explain how knowledge spillovers make different industries agglomerate (Jacobs, 1969; Fernandes et al. 2017). Another important agglomeration advantage is that the clustering of firms allows for more choice in specialist labour (Venables, 2005). Agglomeration advantages play an important role in the pathway development because when a city grows agglomeration theories suggest that this growth will increase exponentially. Therefore, a city will become more locked-in and deviating from the path will become harder.

2.3 Endogenous versus exogenous development

When examining the pathway development of a city, it is important to look at the kind of ongoing development characterizing the city. Weather the core of the development in a city is "endogenous based" or "exogenous based" can make a difference in the development and the resilience of the city itself. In this research, only economic resilience will be discussed. Here, resilience means that adaptive and evolutionary dynamics allow a region to withstand external shocks, disturbance or change (Imperiale & Vanclay, 2016; Carlsson, 2014).

Endogenous development is based on inner assets of the region while exogenous development is based on assets found outside the region and has a more top-down character (Terluin, 2003). A mixture of both development types is empirically tested as the most sustainable (Terluin, 2003). Carlton et al. (2014) support this and emphasize on the importance to keep a balance between these two different kinds of developments.

2.4 Proximity and Gravity theory

The proximity theory suggests that if a city is more remote and smaller, the economic activities should be less than in a bigger city nearer to the economic core area (Redding & Venables, 2002). Since both Drachten and Harlingen had the same number of inhabitants in 1950 (CBS, 1950; Bruintjes, 2007), the distance should be an important factor in the different paths the cities took according to Redding and Venables (2002). Furthermore, being more remote from the core area can lock a city out of networks (Gluckler, 2007). Another theory about proximity is the gravity model, which suggests that the economic flow between two places depends on the economy of origin and destination (Anderson 2016). So, if a city has a larger economy there should be more flows with other economically important regions or cities. Both the proximity theory and the gravity model suggest that a larger city with a bigger economy closer to the core area will have more connections with the core area and should, therefore, have a better economic climate.

2.5 Conceptual model

The question why regions develop differently can be explained by the model shown in figure 1. A developmental path is caused by regional factors and historic events (Boschma, 2007; David, 2000). The regional factors are a sum of the reachability, the economics, the natural resources and the demographics. Regional factors can influence the happening of historic events (Boschma, 2007). These regional factors differ for every place, therefore, the developmental path will differ for every place. A certain developmental path can cause a negative or a positive lock-in. This lock-in is caused by sunk costs and can over time have negative or positive consequences (David, 2000). Eventually, the historic events combined with the regional factors, including a lock-in or not, will result in different development trajectories.
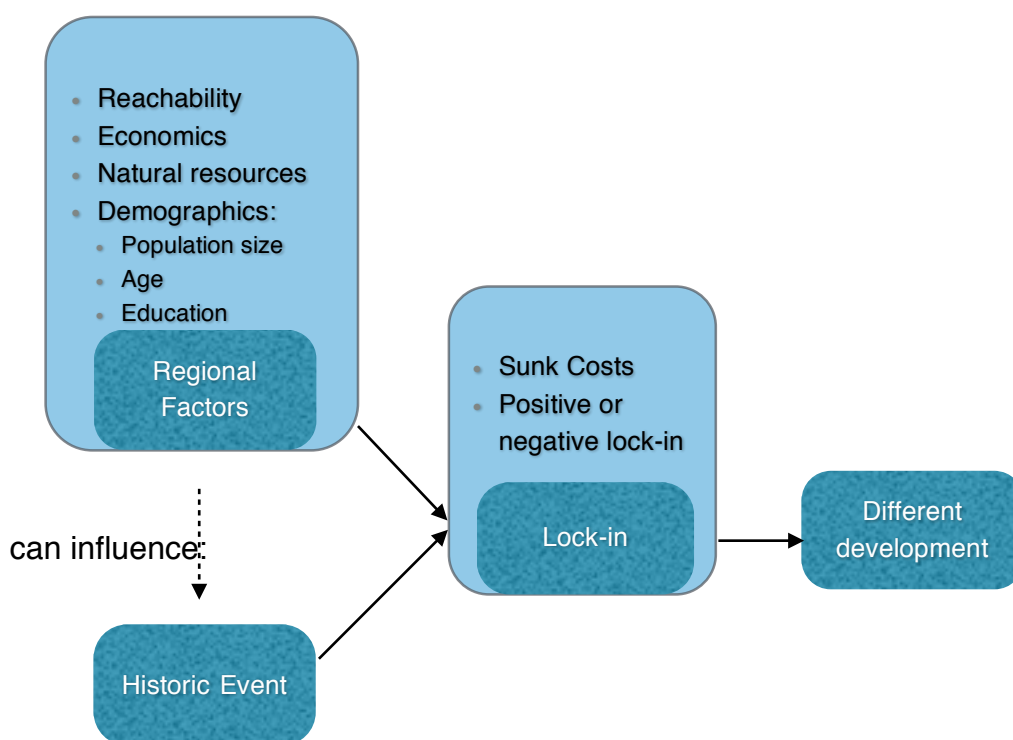
- Reachability
- Economics
- Natural resources
- Demographics:
  - Population size
  - Age
  - Education

Regional Factors

- Sunk Costs
- Positive or negative lock-in

Lock-in

Different development

can influence

Historic Event

Figure 1: Conceptual model visualization

3. METHODOLOGY

The theme of this research dates back to 1950, which makes it hard to collect primary data using a survey or an interview. Therefore, this research is based on secondary data that have been analysed through SPSS and GIS (Steward & Kamins, 1993)

3.1 Secondary data sources

This research derives most of its data from secondary resources which are described below:

- Historic literature: This is an important source for the historic analysis of Drachten and Harlingen. The books contain relevant literature about the history of both cities. The relevant information was derived by scanning the chapters and the headers.

- CBS: This is the main data source in this research. CBS Statline data about the Housing stock, the income distribution, and the number of inhabitants are analysed and discussed. Besides this, other archive CBS data about the migration, the natural population growth and the population from 1950 and onwards are discussed.

- Municipality of Smallingerland: The municipality of Smallingerland provided relevant data about the housing, population and economical changes in the municipality.

- Province of Frisia: The province provided detailed economic data about both municipalities. Unfortunately, the measuring of this detailed data is only available from the year 2000 and onwards.

- NIDI: The NIDI provided data about the number of inhabitants and the population growth in municipalities in the whole Netherlands.

- GIS Data: The GIS data is used to describe changes in reachability of the cities. The GIS data is created by a GIS bachelor project group of the Faculty of Spatial Sciences of the University of Groningen in 2016. The dataset was made by converting (historic) maps into pixel maps in ArcGis. The Historic maps where provided by Stelder (2014) in his research about accessibility of Dutch cities and regions between 1850 and 2009.

3.2 Statistical analyses.

To compare the growth between Drachten, Harlingen, the rest of the Netherlands, North-Netherlands and Frisia, a Oneway Anova is calculated on CBS data, about the housing stock changes between 1950 and 2010 is used (CBS, 2017b).

First, the percentage growth was calculated for all regions. For this the data of Smallingerland and Harlingen were deleted from the data of the Netherlands, North-Netherlands and Frisia. This prevents the data about Smallingerland and Harlingen from influencing the outcome by being tested twice.

Second, the correlation was measured using a Oneway Anova between the housing stock growth percentage and the growth percentage from the year before. The R2 was 0.370 which means the correlation is weak, therefore a Oneway Anova can be measured.

A Oneway Anova was calculated with the growth percentage as dependent variable and the region as factor. A post hoc table showed where the differences were located and which regions differed significantly (Appendix 1).

3.3 GIS analyses

To compare the reachability of both cities two types of GIS analyses were executed. One to visualize the reachability and one to calculate the difference in reachability. The data used for these analyses was created by a bachelor group of the Faculty of Spatial Sciences in 2016. More information about how the data was created can be found in the bachelor thesis of Kootstra (2016).

NETWORK ANALYSES

For the visualization of the Reachability a Network Analyses is done. This analysis is carried out for the years 1948, 1971 and 2007. These years are used because the data is not available for every year in the time period from 1950 till now.

To be able to use the data, (i) the travel time, (ii) the number of kilometers of the shape and (iii) the speed of the railroads (table 1) had to be added to the attribute table. This needed to be done for every year in which the network analysis was made. The calculation of 'Kilometers' and 'Travel_time' was done via the Field calculator tool with the formulas shown in table 2.

After this, a new feature dataset was created for all the different years. The railroads and roads were put in separately because the connectivity of the railroads cannot be set to any vertex, but to end point. The roads had to be set to any vertex. When the feature dataset was created the data was allegeable for a network analysis. For the network analysis points in Drachten and Harlingen were made. These are the points from where the travel times were calculated.

Then, with the Data Analyst, the location (Drachten or Harlingen) was loaded and the impedance was set to 1000 meter, meaning that roads within a 1000 meter radius were measured as starting point. Thereafter the time periods which where visualized were set to 30, 60, 120, 150 and 500 minutes.

Finally, the data analysist was solved for both Drachten and Harlingen in all the mentioned years. This created six maps which visualized the travel times. (Appendix 2-4)

TABLE 1: SPEED OF TRAINS

Year	Speed of trains (Kph)
1948	90
1971	110
2007	130

TABLE 2: FIELD CALCULATOR

Field name	Field type	Expression
Kilometers	Double	[Shape_Length]/1000
Travel_time	Double	([Kilometers]/ [Speed]) *60

ORIGIN DESTINATION COST MATRIX

An OD cost matrix was executed to calculate the exact travel time from Drachten and Harlingen to other cities in the Netherlands. The following cities were chosen for the OD cost matrix:

- Amsterdam, the capital and economic centre of the Netherlands.

- Utrecht, an economically important and centrally located city.

- Maastricht, a city located in the south of the country with a large distance from both Drachten and Harlingen.

- Groningen, the biggest city in the North of the Netherlands, which is the region were Drachten and Harlingen are located.

- Leeuwarden, the capital and biggest city of the province of Frisia in which both Drachten and Harlingen are located.

The travel times from Drachten and Harlingen to the cities named above were measured for the years 1948, 1971 and 2007. The OD cost matrix calculates the fastest travel times by multiplying the shape length with the speed. Therefore, the travel time does not take traffic congestion into account.

3.4 REFLECTION ON THE DATA

Because the theme of the research dates back the 1950, it should be kept in mind that the available data is limited. Large parts of the background information comes from books, which can contain subjective information. Also, the number of books available gave no possibility to compare different stories about the city. By adding numerical data the research is made more objective.

Secondly, a critical reflection on the quality of the GIS data is required. The data was created by a bachelor group and is based on old maps, so the quality is not guaranteed. To solve this problem the results were compared to the current situation and results have been found realistic.

4. HISTORY AND CONTEXT OF BOTH CITIES

To be able to examine and understand the path the two cities have taken it is important to consider their history. Older development policies, plans and projects, indeed, contribute to creating a path for the ongoing and future development of cities.

4.1 Drachten

Until 1641 Drachten did not really exist in the way it does now. Initially, there were two different villages called Noorder- (north) and Zuyderdracht (south). In 1743, these two villages merged and formed Drachten (Dam et al.,1990). For a long time Drachten was a rather insignificant poor village which was primarily reliant on agriculture and the trade of peat. In the beginning of the 20th century the agricultural sector provided jobs for 60% of the working population and the average income was lower than the average of the province of Frisia, which was already lower than the average of the Netherlands (Municipality of Smallingerland, 1990). In the first half of the 20th century a shift became visible. The activities in the village grew, and the village gained a more industrial character. This started the opening of leather and tobacco factories (Dam et al.,1990). Still, the inhabitants were poor. To improve the situation the municipality and the inhabitants founded an industrial committee, which had as goal to create more jobs (Municipality of Smallingerland, 1990). This policy worked and more industry was attracted to Drachten. Large companies like Dunlop and Phillips opened factories in the village which stimulated growth even more. In its heyday in 1971 only 6.6% of the inhabitants worked in the agricultural sector and 47,7% worked in the industry.
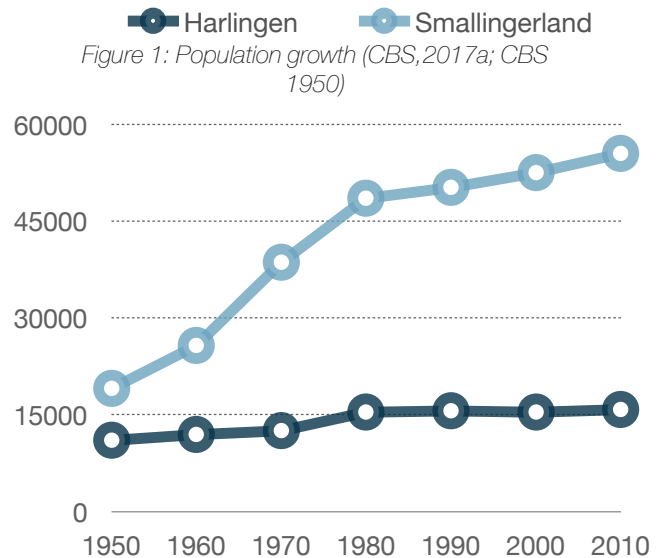
4.2 Harlingen

Harlingen is much older than Drachten. It is one of the old eleven cities of Frisia and its origins are traceable back to 1398 (Schroor, 2015). During the 16th century Harlingen gained more power which, also, resulted in a population growth. In the 16th century the population of Harlingen increased fivefold, a growth unmatched by any other Friesian city at the time (Schroor, 2015 p93). Harlingen became the gateway into Frisia, which made the city very rich (Municipality of Harlingen, 2010). The city of Harlingen was able to keep this prominent position until the first half of the 17th century. After that, just like in the rest of the Netherlands, the economic growth stagnated and the city shrank. In the 19th century the population grew again. This had to do with growth in the industrial sector. With the opening of a railroad to Leeuwarden and the new harbour, a positive energy came to the city (Municipality of Harlingen, 2010). In the 20th century the city grew out of its original city walls and experienced its second heyday (Schroor, 2015 p233). However, soon after the city felt into decline again. This was because trade became more concentrated in Rotterdam, and therefore Harlingen experienced a decline in its importance as a trade city (Schroor, 2015 p249). After the WWII (second World War), the city had trouble starting up their economy again. Therefore, the city decided to lower its ambitions. The main focus shifted towards becoming a local harbour by focusing on fishery and local industry. Beside this, Harlingen wanted to become the 'Wadden city' (Wadden refers to the Waddensea) by putting the emphasis on its location and the monumental character of the city to attract tourists.

5. GROWTH OF THE CITIES

One of the core reasons why Drachten and Harlingen are compared is because the difference in growth. A further examination of the growth of Drachten and Harlingen, both in terms of population and size, is therefore required.

5.1 Demographics

Demographic growth is an important indicator when discussing different developmental paths. Differences in demographic growth suggest differences in the developmental path. Both Drachten and Harlingen have grown demographically, since 1950 (Figure 1). What becomes evident when looking at figure 1 is that Smallingerland has grown more than Harlingen. The population of Smallingerland has grown by 191% from 1950 till 2010. In the same period the population of Harlingen has grown by 44% (CBS, 1950; 2017a). The population growth of Smallingerland was, from 1950 till 1999, the largest one among the three northern provinces of the Netherlands (NIDI, 2003).

Figure 1: Population growth (CBS,2017a; CBS 1950)

Migration figures about Smallingerland show that, differently from Harlingen, there was a peak in migration between 1960 and 1980 (figure 2). This has to do with the growing industry and the increase of jobs in Drachten (Municipality of Smallingerland, 1990). Harlingen, in the same time period, had a low or even negative net migration saldo (figure 2). Differences can also be seen in the natural population growth (figure 3). In Smallingerland the natural population growth is higher than in Harlingen, this is because of a high fertility in Smallingerland (CBS, 2000a; 2000b). This can, just like the migration peak, be explained by the growth of industry in Drachten. Industry has a high demand for young workers whom have a high fertility rate. Therefore, industry had a non-direct effect on the population growth in Drachten.

Figure 2: Net migration (CBS 2000a; 2000b; 2017c)

Figure 3: Natural Population Growth (CBS 2000a; 2000b; 2017c)
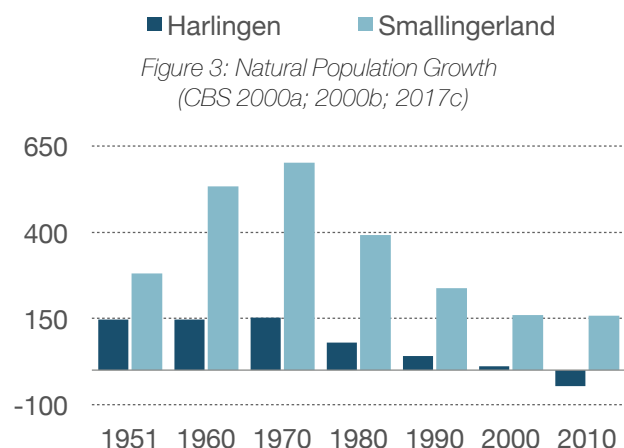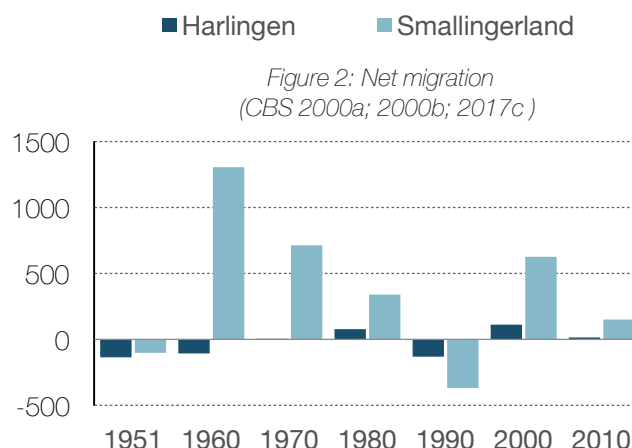
5.2 Housing stock

Something that should be taken into account when examining the spatial growth of a city is that the housing stock growth does not need to reflect the growth in population in a city. In the period from 1950 till 2016 the number of one person households has become ten times larger (from 245 to 2906) and the average household size has changed from 3,93 persons in 1950 to 2,17 persons in 2016 (CBS, 2017a). Harlingen is a good example of a city where the number of houses increased more than the population. The housing stock in Harlingen rose from 2741 in 1950 to 7091

Figure 4: Housing Stock (CBS,2017b)

in 2010 (+159%), in this period the population changed from 11010 to 15821 (+44%) (CBS, 1950; 2000a; 2017a; 2017b). In Smallingerland the housing stock grew more than in Harlingen (figure 4), from 1950 till 2010 the housing stock grew from 4686 to 24055 (+413%). The population, in this period, grew from 19035 to 55467 (+191%) (CBS, 1950; 2000b; 2017a; 2017b). So, while both cities experienced spatial growth, Harlingen grew more in size compared to population growth. In Harlingen, the percentage of housing stock growth is 3.61 times higher than the percentage of population growth, while in Smallingerland this is only 2,16 times. This is because it is hard for the housing stock to keep up with rapid short-term population growth. Therefore, the housing stock needs more time to level with the population growth. This is visible when comparing figure 1 and 4. The extreme population growth in Drachten between 1960 and 1980 is less visible in the housing stock changes. However, after the population growth in 1980 stagnated the housing stock was and is still growing at the almost the same speed as between 1960-1980 (figure 1 & figure 4). Image 1 visualizes that, although the population growth in Harlingen was only 44% the housing stock grew more. The image also visualizes that in Drachten after the peak in population growth, from 1960 till 1980, the housing stock still grew a lot.

The growth in Smallingerland and Harlingen is also compared to the rest of the Netherlands, North-Netherlands and Frisia. This is done by a Oneway Anova. The results show that the housing stock growth in Smallingerland differs significantly from the growth in all other regions. From a statistical perspective, the housing stock growth in Smallingerland is not only significantly different from Harlingen, but is also significantly different from Frisia, North-Netherlands, and the Netherlands as a whole. This means that Drachten experienced exceptional growth between 1950 and 2016 (Table 3; Appendix 1).
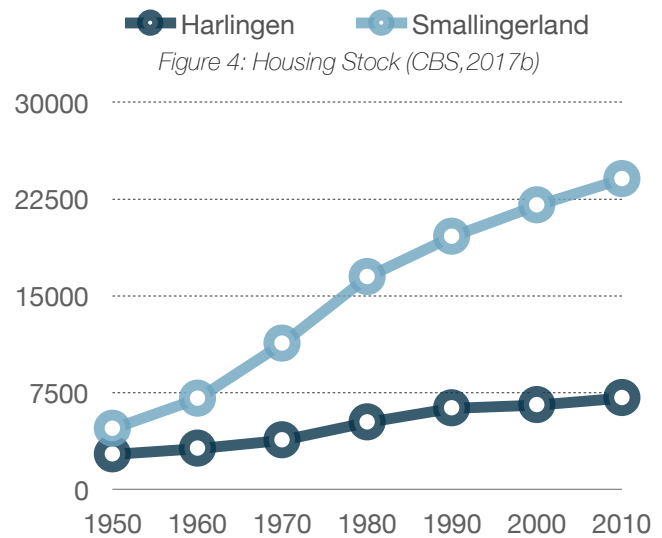
Table 3: Oneway Anova Housing stock

		Significance
Harlingen	Netherlands	1,000
	North-Netherlands	1,000
	Frisia	1,000
	Smallingerland	0,000
Smallingerland	Netherlands	0,037
	North-Netherlands	0,000
	Frisia	0,000
	Harlingen	0,000

Data gathered both in relation to demographic trends and housing stock concern the municipalities and not the cities, since there is no data available on that scale. For the municipality Harlingen this is not an issue because out of the 15810 inhabitants 14645 live in the city of Harlingen (CBS, 2011). The municipality of Smallingerland is, in terms of size, larger and includes a larger amount of smaller villages. In 1950 the city of Drachten had 10156 inhabitants (Bruintjes, 2007) and the municipality 19035 inhabitants (CBS, 1950), so around 10000 people lived outside the city. Currently, in 2017 the city of Drachten has 45186 inhabitants and the municipality has 55704 inhabitants. So, around 10000 people still live outside the city (Municipality of Smallingerland, 2017). On the basis of this information it can be concluded that the number of inhabitants outside the city was relatively stable and only the population size of Drachten itself grew significantly.

Image 1: Spatial changes of Harlingen and Drachten
(Kadaster, 2017)
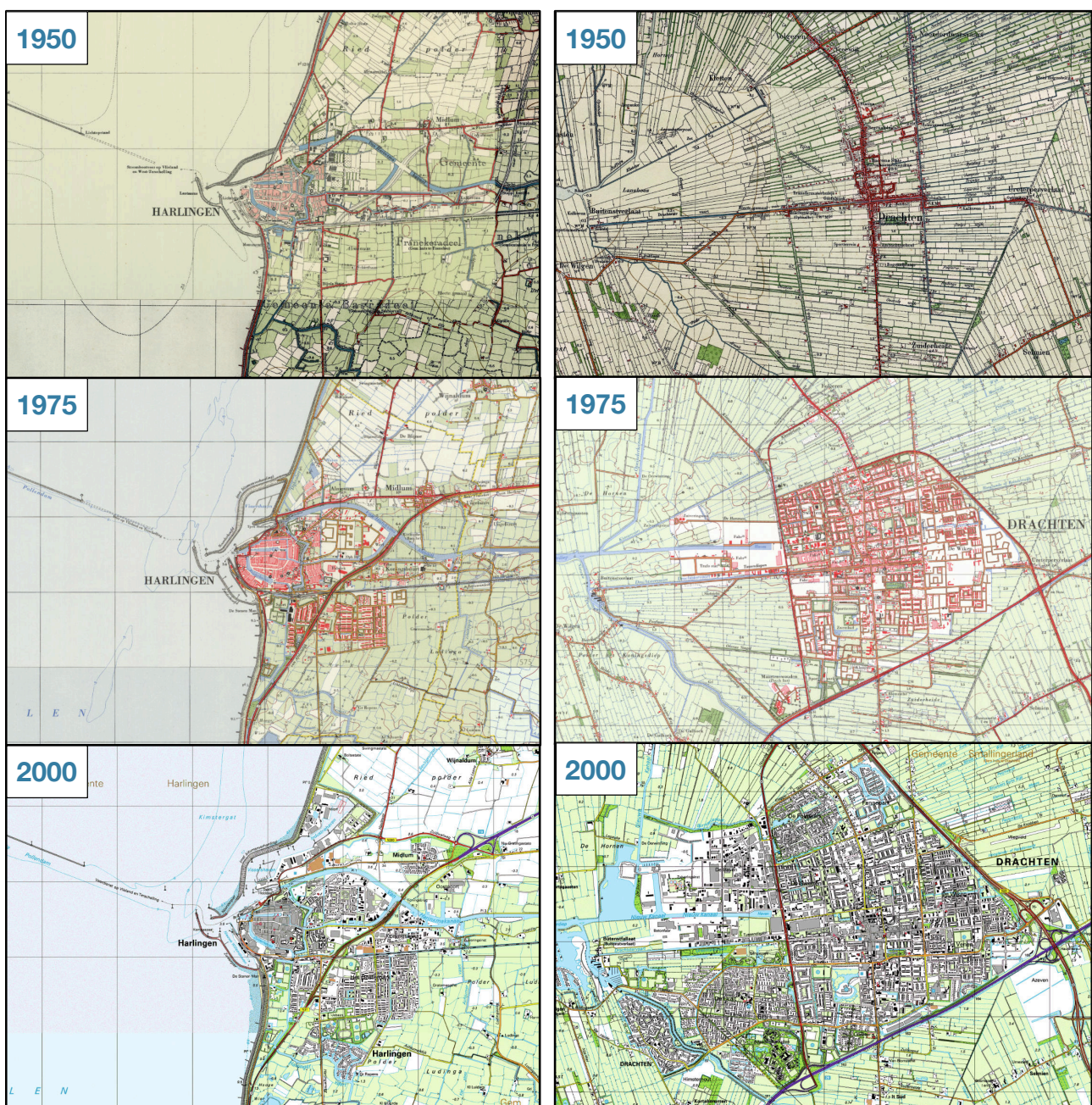
6. ECONOMICS

Besides differences in growth, there are differences in economic factors as well: as mentioned before, both cities have different main economic branches.

6.1 Core economic branch

The core economic branch is important for the growth of a city. If a certain economic branch flourishes, a city will flourish with it because of the growth in employment and profit.

DRACHTEN

In Drachten the industry has significantly grown after 1950. A primary factor was a policy change to attract more industry to Drachten. This was necessary because the city was had a low average income (Municipality of Smallingerland, 1990). The new policy was very successful and the timing was just right. After the WWII, the welfare increased and the culture in the Netherlands became more consumeristic (Kromhout, 2007). Therefore, the demand for consumer goods increased, which also necessitated increased production. With the opening of the Phillips factory in 1950 an industrial path in the city was started as the factory became one of the main employers and had a pulling factor on other industry (municipality of Smallingerland, 1990).

The establishment of the Phillips factory allowed for agglomeration advantages, because of knowledge spillovers, thus increasing the attraction of Drachten as a cluster for other companies. (Fernandes, 2017; Marshall 1890). More inhabitants mean more facilities. So not only did the industrial sector experience growth, but over time other economic braches enjoyed growth as well. This has given Drachten a regional function. Figure 5 shows that the industry still plays a big role in the economy of Drachten and is the biggest employer.

HARLINGEN

Harlingen has, over time, lost its trade advantages (Schroor, 2015). Harlingen might have experienced the effects of a negative lock-in wherein the old harbour functions did not match the modern demand (David, 2000). Therefore, Harlingen was forced to change their economic focus after the WWII. Fishery became more prominent because of movement of 'Zeeuwse' fishers to Harlingen (Schroor, 2015). With the opening of 'De nieuwe industriehaven' and 'Het Harinxmakanaal' trade and industry continue to play a role, but on a more regional scale (Municipality of Harlingen, 2010; Schroor, 2015). Also, Harlingen made use of its historic inner city and location to attract tourists. Industry and mineral extraction remains, just as in Drachten, the main source of employment in the municipality of Harlingen (Figure 5). However, since the data for Harlingen combines Industry and mineral extraction, it should be noted that the real industrial sector is therefore smaller than shown in figure 5.

Figure 5: Job diversement (Province of Frisia, 2017)
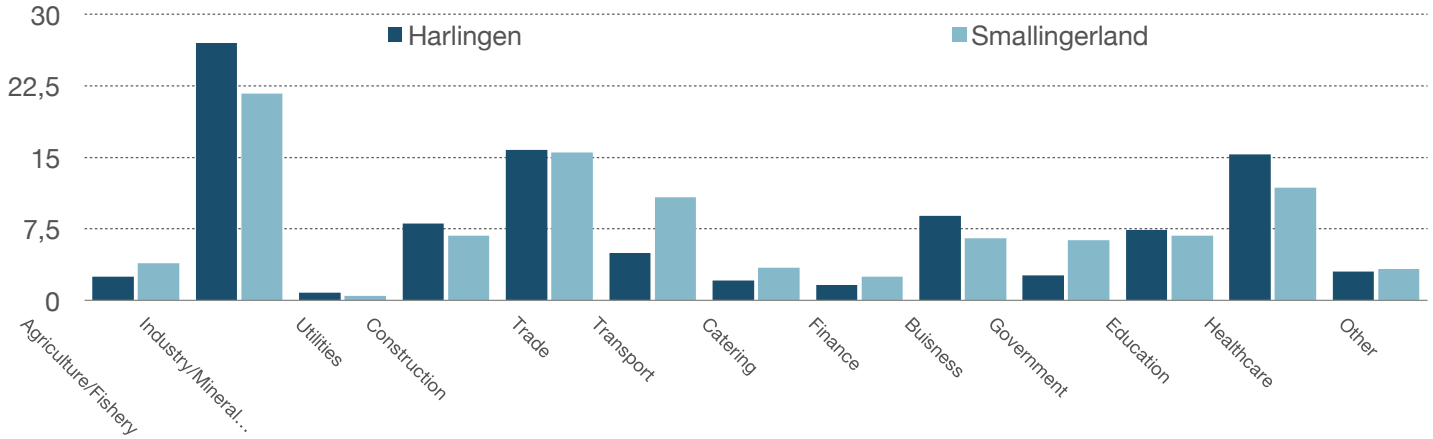
6.2 Economic growth and resilience

Short-term economic growth within a city does not necessarily translate into sustainable longer-term growth. Therefore, the resilience of the economy plays an important role and needs to be assessed carefully.

DRACHTEN

In Drachten, the economy experienced a growth in the years after the WWII. This growth was because the upcoming industry in the city allowed for increased employment and therefore increased population growth as well. Other industrial firms where attracted to the city because the agglomeration of industry in the city made it easier for firms to find good employment. This because a lot of skill and knowhow was now located within the city (Veneables, 2005). Furthermore, urbanization externalities made the economy in other branches grow as well (Jacobs, 1969; Fernandes et al.,2017).

Important to keep in mind is that the placement of factories such as Phillips and Dunlop within Drachten was an exogenous development because the companies are not regionally based, so there is no local ownership. Instead, the headquarters have no place attachment with Drachten but take location at the most profitable place (Venabes, 2005). Exogenous developments are less sustainable than endogenous development (Terluin 2003). The fact that this type of development is not always sustainable is indeed visible in Drachten. Drachten was, and still is, very reliant on the industrial sector so if there is an economic crisis Drachten is usually hit hard. The biggest effects of this where visible during the oil crises of 1973 and 1979. In 1971 47,7% of the working inhabitants was employed in the industry. In 1981 only 33.9% of the population worked in the industry (municipality of Smallingerland, 2017). The Phillips factory, one of the main employers, went from 2500 employees in 1970 to 1400 in 1990 (municipality of Smallingerland, 2017). These numbers show that the crisis had big impacts on the employment in the city. The population growth stagnated significantly after the 70's as well. Just as during the crisis of 1973 and 1979 Drachten struggled again during the crisis of 2009. Between 2009 and 2010 there was a job loss of 3.1%, (893 jobs), in absolute numbers the biggest lost in the province (Province of Frisia, 2017). From 2008 till 2010 616 jobs were lost in the industry (-11.5% of industrial employment) (province of Frisia, 2017). This shows that Drachten lacks resilience in the event of an economic crisis (Carlsson, 2014).

HARLINGEN

Harlingen took a different economical path than Drachten after the WWII. Harlingen's economy became more regional, letting go of its ambitions of becoming an international harbour. This means that in Harlingen there was more endogenous development compared to the exogenous development in Drachten. The city focused more on tourism, regional trade, local craftsmanship and fishery (Schroor, 2015). From 2001 till 2016 the number of jobs in Harlingen grew with 13.9%. The number of jobs in Frisia grew, in this same time period, with 12.5% (Province of Frisia, 2017). This means the percentage of jobs in Harlingen, in years of crisis, grew more than the average of Frisia. Also, the effects of the economic crisis's in the 1970's were much lower in Harlingen than in Drachten. Harlingen thus didn't grow as much as Drachten; however, the growth was more resilient. Which means that external disturbance, such as an economic crisis, had less influence on Harlingen (Carlsson, 2014)
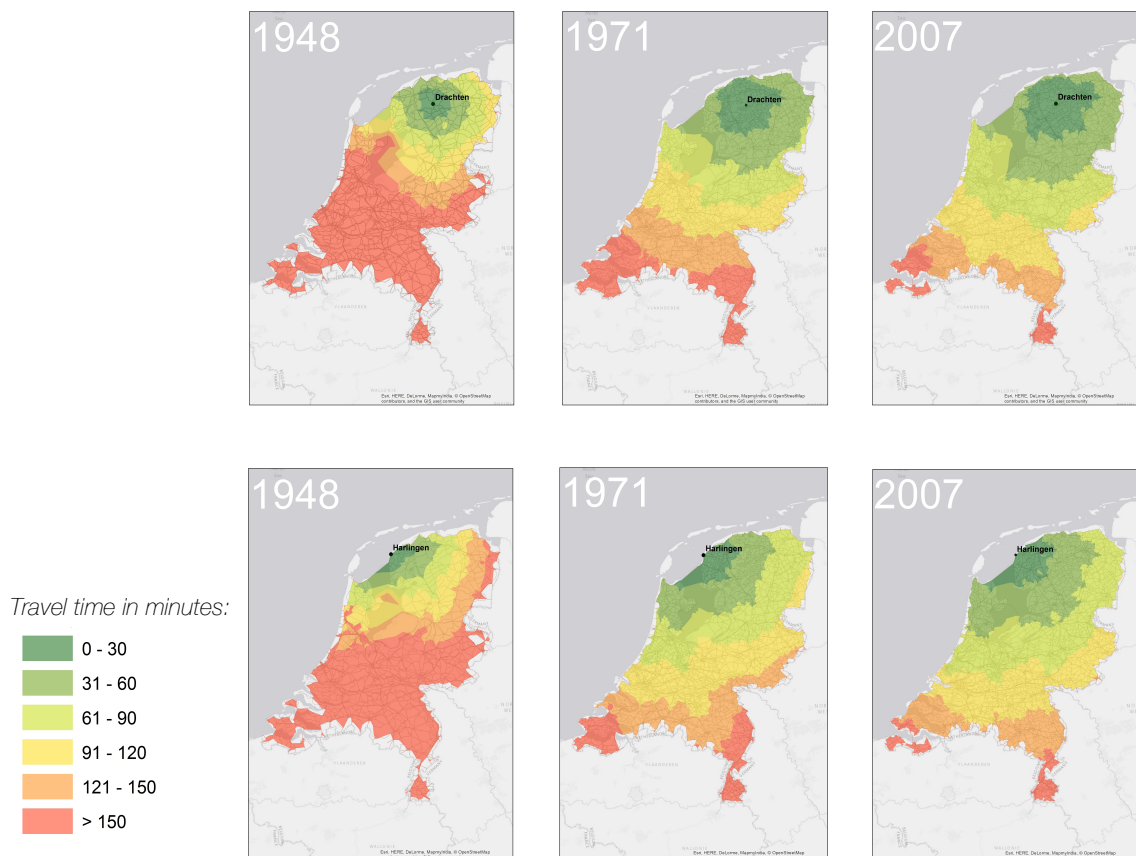
7. REACHABILITY

One of the main driving factors for a city's growth is how the city is connected to other cities in the country. Therefore, the developmental path is strongly influenced by the reachability of the city.

7.1 Visualization of the Reachability

Visible on the maps (Image 2; Appendix 2-4) is that the reachability of both Drachten and Harlingen has changed a lot over the years. In 1948 the reachability of both cities was low. This has to do with the WWII which had just ended. After the war, the reachability of both cities grew rapidly. This is clearly visible when comparing the maps of 1948 and 1971. The images show the central position Drachten has in the north of the Netherlands. This made Drachten, already in 1948, a central and accessible place in the north of the Netherland. However, Drachten is harder to reach from the Randstad (The economic core area of the Netherlands) when compared to Harlingen. The gravity and the proximity theories suggest that the best reachable place should grow more, but the cases of Drachten and Harlingen show the opposite happened (Redding and Venables, 2002; Anderson, 2016). Therefore, there it can be said that reachability is of less importance than expected.

Image 2: Network analyse

Travel time in minutes:

- 0 - 30
- 31 - 60
- 61 - 90
- 91 - 120
- 121 - 150
- > 150

7.2 Travel times

To illustrate reachability, the exact travel times to Drachten and Harlingen have been calculated by analysing the travel times from several cities to Drachten and to Harlingen (Table 4). This is done by an OD cost matrix and results in some big differences. Harlingen is almost always more reachable. The only two exceptions are Groningen and Maastricht, because Drachten is much closer to Groningen, and the travel time from Harlingen to Maastricht in 2007 is longer when compared to the travel time to Drachten to Maastricht. This confirms what the images already illustrated, that Harlingen is better reachable. Which, again, implies that the reachability was not the main factor for the growth of Drachten.

Table 4: OD cost matrix

	1948	1971	2007
Drachten to Leeuwarden	0:33	0:21	0:21
Harlingen to Leeuwarden	0:26	0:18	0:16
Drachten to Groningen	1:00	0:23	0:23
Harlingen to Groningen	1:52	0:58	0:52
Drachten to Amsterdam	3:09	1:37	1:17
Harlingen to Amsterdam	2:10	1:06	1:00
Drachten to Utrecht	2:10	1:40	1:26
Harlingen to Utrecht	1:52	1:26	1:21
Drachten to Maastricht	9:00	3:19	2:51
Harlingen naar Maastricht	8:21	2:58	2:55

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusion

It can be concluded that Drachten and Harling took different developmental paths. By analysing both the population and spatial growth the two different developmental paths become clear. Harlingen has experienced a relatively low growth both in population and in size when compared to the growth Drachten experienced.

According to the conceptual model there are two causes of these different developmental paths: historical events and regional factors. Arthur (1989) said that the historical events occur randomly across space. Boschma (2007) provides critique of this theory by saying that historical events are highly dependent on space and regional factors. In the cases of Drachten and Harlingen historical events played the most influential role in their developmental paths, and these historical events seemed to have occurred randomly. Regional factors did have an influence as well, but they are not the main reason for the growth in Drachten. This growth can be explained by a policy change and the opening of the Phillips factory Drachten in 1950. The opening of the Phillips factory created agglomeration advantages which had a pulling factor making the industrial sector grow exponential. This growth in industry meant there were more jobs so young, fertile, workers migrated to Drachten. The growth meant that the city gained more and more of a regional function. The regional factors themselves were of less importance in this growth. It can even be argued that Harlingen might have had more favourable regional factors. From a historical perspective, Harlingen experienced greater growth in wealth earlier on. Secondly, Harlingen's economic situation was better in 1950. Thirdly, the reachability of Harlingen was, and still is, better than the reachability of Drachten. The main reason why Harlingen did not experience great growth is because, in 1950, Harlingen experienced a negative lock-in. After the WWII, the harbour became outdated and less profitable, but the city was still very reliant on the harbour which forced Harlingen to take a different developmental path.

Drachten did grow more than Harlingen, but the growth in Drachten was less resilient. During the crises of 1973, 1979 and 2009 Drachten was hit hard and lost many jobs, in the same years Harlingen was hit less hard. The reasons for this difference in resilience can be explained through the different types of development in the cities. In Drachten the development was exogenously based and the factories that were place had no regional bases. In Harlingen the new path the city took was regional and therefore based on endogenous development, this is more resilient than exogenous development (Terluin 2003). Also, the large growth Drachten experienced in a small time period was not sustainable.

8.2 Recommendations

This research had some interesting findings that in small cities historic events play a larger role than regional factors in pathway-development. However, this research only focusses on two small sized cities. Therefore, it is important to look at other small sized cities to be able to draw conclusions about which factors play the most important role. Furthermore, it is important to look more at the sustainability and resilience of growth by for example looking not only looking at economic resilience, but at other types of resilience as well.

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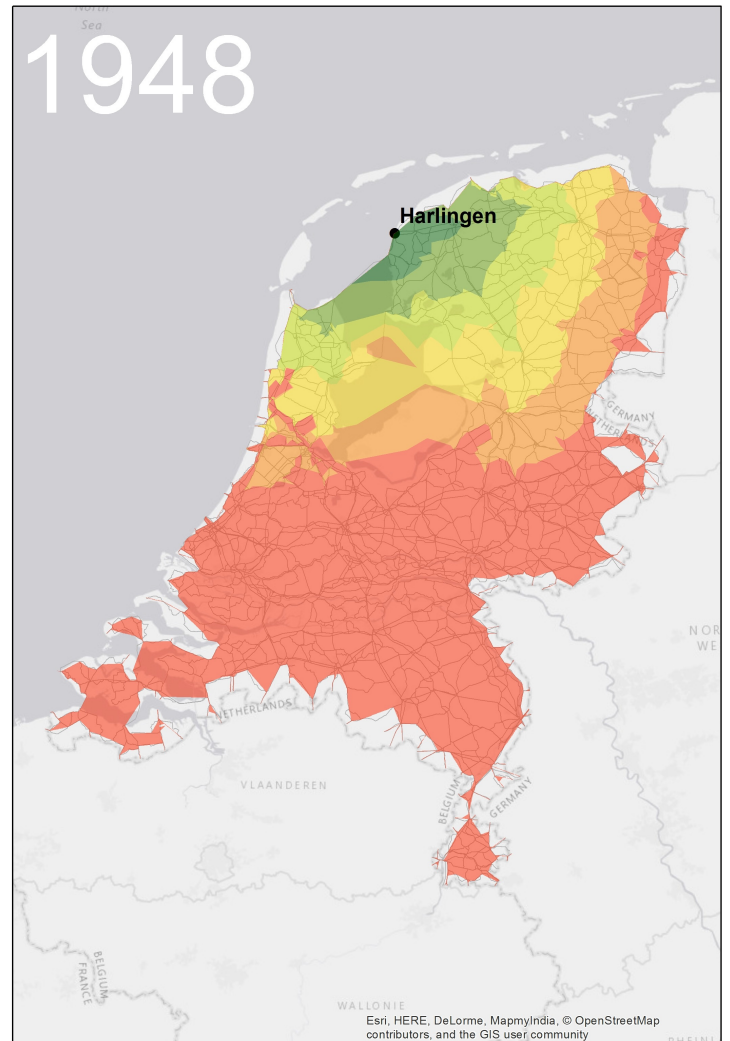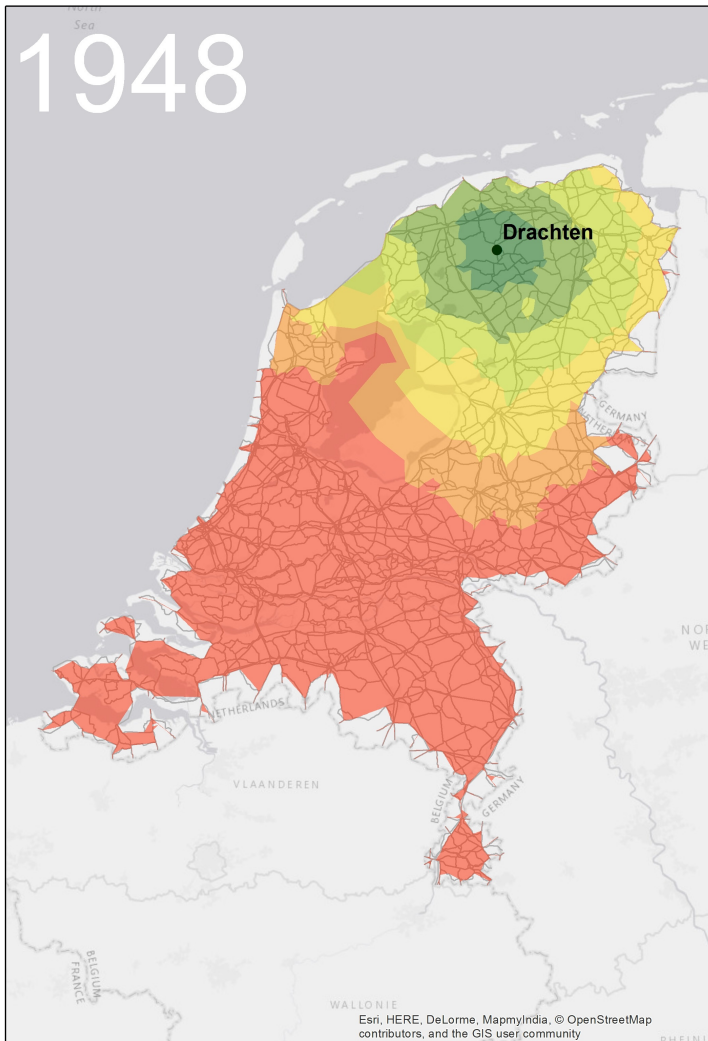
(I) Gebied	(J) Gebied	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Nederland	Noord-Nederland	,412257639569620	,272234142589052	1,000	-,3576	1,1821
	Friesland	,554340501683904	,272234142589052	,426	-,2155	1,3242
	Harlingen	,347762955802857	,272234142589052	1,000	-,4221	1,1176
	Smallingerland	-,797605128716904*	,272234142589052	,037	-1,5674	-,0277
Noord-Nederland	Nederland	-,412257639569620	,272234142589052	1,000	-1,1821	,3576
	Friesland	,142082862114285	,272234142589052	1,000	-,6277	,9119
	Harlingen	-,064494683766763	,272234142589052	1,000	-,8343	,7053
	Smallingerland	-1,209862768286524*	,272234142589052	,000	-1,9797	-,4399
Friesland	Nederland	-,554340501683904	,272234142589052	,426	-1,3242	,2155
	Noord-Nederland	-,142082862114285	,272234142589052	1,000	-,9119	,6277
	Harlingen	-,206577545881048	,272234142589052	1,000	-,9764	,5632
	Smallingerland	-1,351945630400809*	,272234142589052	,000	-2,1218	-,5820
Harlingen	Nederland	-,347762955802857	,272234142589052	1,000	-1,1176	,4221
	Noord-Nederland	,064494683766763	,272234142589052	1,000	-,7053	,8343
	Friesland	,206577545881048	,272234142589052	1,000	-,5632	,9764

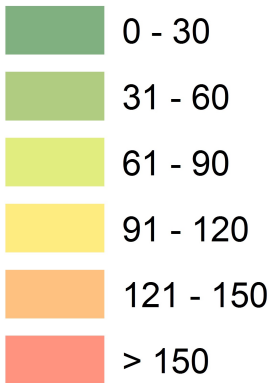|						
	Smallingerland	-1,145368084 519761*	,2722341425 89052	,000	-1,9152	-,3755
Smallingerland	Nederland	,7976051287 16904*	,2722341425 89052	,037	,0277	1,5674
	Noord-Nederland	1,209862768 286524*	,2722341425 89052	,000	,4399	1,9797
	Friesland	1,351945630 400809*	,2722341425 89052	,000	,5820	2,1218
	Harlingen	1,145368084 519761*	,2722341425 89052	,000	,3755	1,9152

*. The mean difference is significant at the 0.05 level.

Travel time in minutes
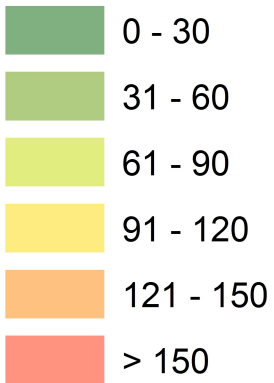
- 0 - 30
- 31 - 60
- 61 - 90
- 91 - 120
- 121 - 150
- > 150

Travel time in minutes

- 0 - 30
- 31 - 60
- 61 - 90
- 91 - 120
- 121 - 150
- > 150
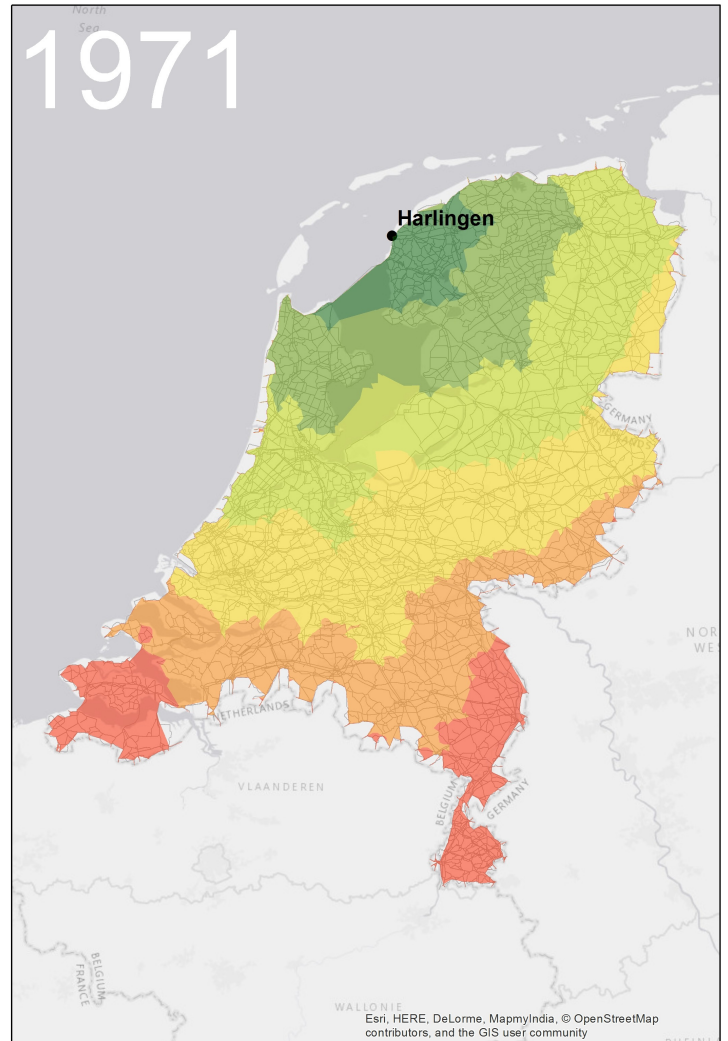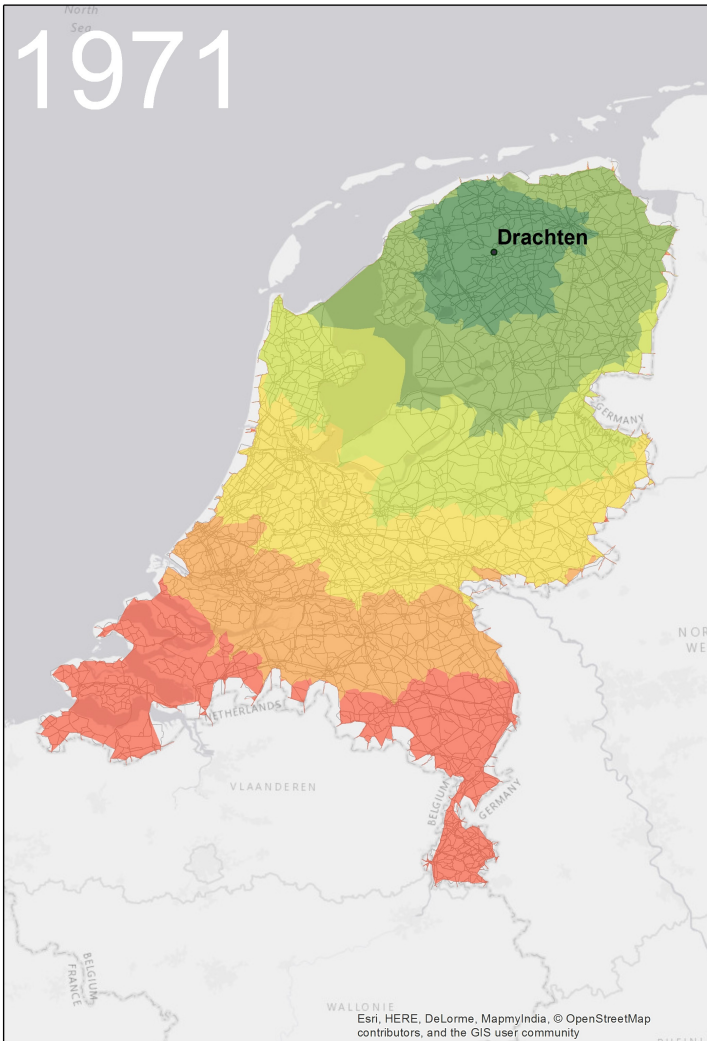
APPENDIX 4: REACHABILITY 2007

Travel time in minutes

- 0 - 30
- 31 - 60
- 61 - 90
- 91 - 120
- 121 - 150
- > 150